Docket DPU 92-92 Exhibit PLC-10

COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC UTILITIES

SUPPLEMENTARY DIRECT TESTIMONY OF

PAUL CHERNICK

ON BEHALF OF

THE TOWN OF LEXINGTON

July 17, 1992

RESOURCE INSIGHT, Inc. 18 Tremont Street Boston MA 02108 (617)-723-1774

- 2 Q: State your name, occupation and business address.
- 3 A: I am Paul L. Chernick. I am President of Resource Insight,
- Inc., 18 Tremont Street, Suite 1000, Boston, Massachusetts.
- 5 Q: Are you the same Paul Chernick who previously filed testimony
- 6 in this proceeding?
- 7 A: Yes.
- 8 Q: What is the purpose of the supplementary testimony?
- 9 A: Due to the schedule in this proceeding, I prepared my initial
- 10 testimony prior to receiving Boston Edison's information
- requests. The purpose of this supplemental testimony is
- simply to update my initial testimony to reflect BECo's
- answers to the Town of Lexington's information requests, and
- to correct some errors in my initial testimony.
- 15 Q: What areas of your initial testimony are you supplementing
- today?
- 17 A: I have updated information on the life of the lamps BECo uses
- in its street lights, the number of lamps of each type BECo
- has on its system, and the shape of those lamps. As a result
- of BECo's responses to discovery, I also have new information
- **21** on
- 22 Edison's rationale for using the wrong lamp life for the
- Daylux lamp;
- 24 the limits of Edison's information on high-quality
- 25 lighting;

Edison use of the term "standard" as it applies to
setting streetlighting rates;

- the derivation of the 25% adder for "non-standard" streetlighting lamps; and
 - the basis for Edison's opposition to customer ownership of streetlighting equipment on Edison poles.
- 7 Q: What updated information can you provide the Department on the life of the lamps BECo uses in its street lights?
- 9 A: The attached Table 1 (revised) provides data from BECo's
 10 Information Response (IR) TL-1-17. Note that the lives of
 11 the incandescent lamps are even lower than I had originally
 12 suggested. Other than the 60W, 200-lumen fire-alarm lights,
 13 the incandescents have lives of 3,000-6,000 hours. As shown
 14 in Table 8, BECo's data indicate that the 1,000-lumen lamps,
 15 with 6,000 hour nominal lives, actually last only 4,700-5,300

¹Curiously, BECo lists no suppliers for the three largest incandescent lamps. Also, the wattage and lumen information supplied by the manufacturers for the incandescents is almost always different from the information BECo uses in its rates and rate design.

²BECo also lists a 2,500-hour general purpose lamp (lamp 4A in BECo's list). The lumen listing on page 2 of IR TL-1-17 for this lamp is incorrect. The correct value, from p. 16 of IR TL-1-17, is 970 lumens. This lamp produces as much light as the 1000-lumen streetlighting lamp, and uses less energy (67W versus 103W for Phillips and Sylvania; GE does not list its lamp's wattage), but lasts less than half as long.

hours.³ The compact fluorescent and white HPS lamps that can replace these lamps will all last substantially longer than the incandescents.

IR TL-1-17 also confirms that three of BECo's four suppliers rate their 35W HPS lamp at 16,000 hours.

6 Q: What updated information can you provide the Department on 7 the number of lamps of each type BECo has on its system?

A: Table 5 (revised) compares my estimates to the data BECo provided in IR TL-1-1. Despite some changes in the individual numbers, the overall implication is the same: many of BECo's "standard" lamps are much more specialized than the Daylux or other high-quality efficient lamps are likely to be.

Q: What updated information can you provide the Department on the appearance of BECo's streetlighting lamps?

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A: Table 7 lists the bulb type for each of the mercury vapor and HPS lamps in IR TL-1-17. The numerical portion of the bulb identification is the diameter in eighths of an inch. The differences signified by the letter prefixes (such as "E," "ED," "BT," and "T") are often rather subtle; in particular, Sylvania uses the same figure to illustrate "B" and "E" lamps,

The uncertainty is due to an apparent error in BECo's data for 1990. If, as seems likely, the 1018 lamp replacements listed for that year should be 2018, the average life falls from 5,300 hours to 4,700 hours.

and "ED" appears to vary from these lamps only in having a flattened tip.

Figure 1 provides Phillips' illustrations of the various HID bulb shapes.⁴ The 100W mercury and the 50W, 100W, and 150W HPS bulbs are identical to one another, as are the 250W and 400W HPS bulbs. On the other hand, BECo also uses two totally different bulbs, the E/ED-18 and the T-15, for 250W and 400W HPS lamps, and uses both E-37 and BT-37 bulbs for the 400W mercury. The Daylux lamp is quite distinctive, and would be easier to distinguish than most of the other lamps.

- Q: What new information do you have regarding Edison's rationale for using the wrong lamp life for the Daylux lamp?
- A: This error is explained in IR TL-1-16. BECo is apparently under the impression that Randall Rice's reference to a 10,000-hour life was based on an evaluation of the Daylux lamp in an enclosed fixture, and that the 12,000-hour rating is only applicable to indoor operation in an open fixture.

As is clarified in Exhibit PLC-11, the Daylux distributor told Mr. Rice that the lamp spectrum would tend to shift towards orange after about 10,000 hours. In indoor applications, such as retail sales or office building lobbies,

⁴The BT-46 bulb used for 700W mercury lamps is slightly shorter and a bit skinnier than the BT-56 bulb. I combined Phillips' illustrations of a T-10 tube and a medium base to illustrate the T-9.5 Daylux.

this shift would probably justify lamp replacement. In streetlighting, variation in lamp color is common for aging HID lamps; mercury lamps on a single block can produce a half-dozen tones of blue, purple, and green. The color shift of the Daylux is unlikely to be a serious problem, especially since all the lamps in a particular area will tend to shift together. In any case, the lighting quality of the Daylux at 12,000 hours will be better than the lighting quality of standard HPS lamps.

 BECO's argument that Mr. Rice's 10,000-hour life estimate for the Daylux was related to the enclosed streetlighting fixture is not supported by Mr. Rice's letter (Exhibit BE-RDS-10, p. 75), which mentions color shift, but not enclosure. The data BECo provided on the Daylux lamp (Exhibit BE-RDS-10, pp. 69-74) does not condition the lamp life on operation in an open fixture. To the contrary, Exhibit BE-RDS-10 reports a 12,000 hour life in a very tight reflector enclosure (p. 72) and states that "Open bottom fixtures are acceptable. A lens cover is not required." Open fixtures are described as an option, not a requirement.

Thus, BECo's assumption of a 10,000-hour operating life for the Daylux lamp appears to be completely unwarranted.

⁵The manufacturer is careful to specify a ballast (p. 69), but does not mention a fixture requirement.

Q: What new information do you have regarding the limits ofEdison's information on high-quality lighting?

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TL-1-10 and IR TL-1-31 indicate that BECo A: has no information on electronic ballast availability, IR TL-1-11 indicates that BECo has no information on lamp prices, and IR TL-1-14 indicates that BECo has no information on the use of alternative lamps for streetlighting. This lack of information is particularly disappointing, given the long period of time over which Lexington has been seeking to obtain high-quality energy-efficient street lights.

Q: What new information do you have regarding Edison's use of the term "standard" as it applies to setting streetlighting rates?

A: BECo has introduced a number of implicit definitions of "standard." First, Exhibit BE-RDS-1, p. 24, and the proposed Rate S-1 (Exhibit BE-RDS-1, p. 56) equate non-standard lamp types with "cases where a customer requests additions to the Company's existing schedule of streetlights," and suggest that standard status may be related to "minimum ordering requirements." Yet BECo cannot cite any other instance in which it has applied a "non-standard" adder for rate design,

⁶BECo does not appear to have imposed strict minimum-order requirements on earlier lights. For example, only 12 of the 35W HPS lamps were installed in the first 6 months they were available (IR TL-1-21).

conservation, or streetlighting (IR TL-1-39, IR TL-1-40). Of the 42,000 types of items in stock, BECo sent out only 13,300 in 1991, or 32% (IR TL-1-24). The average item is thus used less than once in three years; many items must be used even less frequently, probably not more than once a decade. Yet every one of these 42,000 items is "standard" by BECo's definition (IR TL-1-28).

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Second, Exhibit BE-RDS-21, p. 2, appears to equate "standard" with a mogul base. Yet several of BECo's "standard" lamps (the 35W HPS and various incandescents) use the same medium socket the Daylux uses. IR TL-1-21 indicates that BECo is unable to identify any special charges applied to the medium-base 35W lamp, either now or when it was first offered.

Third, Exhibit BE-RDS-21, IR DPU-8-15, IR DPU-8-16, and TL-1-26 imply that the Daylux is non-standard in that it looks like the standard 50W lamp but would be incompatible with the standard luminaire. As I have shown, the Daylux is more easily distinguished than are other BECo lamps. Hence, if "non-standard" meant "looks like something its not," the 400W and 700W mercury lamps and the 35W HPS lamp would be the only

"standard" HID lamps among BECo's current offerings, and the Daylux would be standard.

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Fourth, IR TL-1-26 suggests that the real problem with the Daylux lamp is that the <u>luminaire</u> is difficult to distinguish in the field from that of the standard HPS lamp. "The ANSI specified external markings for field identification of luminaires would be the same for a standard 50 watt high pressure [sodium] luminaire and the EYE lamp's luminaire. Additional time is required for T&D personnel to correctly identify the luminaire in the field." BECo apparently refers here to the one- or two-digit labels (some of which appear to attached to contemporary luminaires, be stickers) illustrated in IR TL-1-37, p. 8, and reproduced in Exhibit PLC-14. Various BECo luminaires in Lexington are labeled "35" for 35W HPS, "5" for 50W HPS, "10" for 100W HPS (and some mercury lamps), and "25" for 250W HPS. These labels are obviously helpful, but they are hardly essential. luminaires (including virtually all the mercury luminaires in Lexington) do not have these labels, cannot be distinguished by the appearance of the luminaire, and (being drop-dish, rather than cutoff, luminaires) cover the lamp with a prismatic refractor, through which the lamp cannot be seen.

⁷BECo did not respond to the request in IR TL-1-37 for description of the markings on various lamps and the color and markings of their packaging.

Somehow, BECo has managed to put the right lamp in mercury luminaires for the last 30 years without external labels. Accurate lamp replacement is facilitated by BECo's street-by-street, pole-by-pole list of street lights (one page of which is attached as Exhibit PLC-15). For the cut-off luminaires used for most new lights, the visibility of the bulb also makes it easier to tell the difference between lamps. Even if BECo staff needed labels to tell what type of lamp is in each luminaire, BECo could:

- use a different color of stick-on label for each technology: standard HPS, mercury, white HPS, and so on;⁹
- use a distinguishing second digit, such as labelling the standard 50W HPS as "51" and the Daylux as "52;"
- use a strip of colored tape, or a geometric shape, to differentiate between technologies.

Since BECo will continue to have both HPS and mercury lamps on its system, in the same luminaires, it must continue to distinguish between technologies, whether it offers alternatives or not.

⁸If the Daylux lamp is non-standard because the label would be the same as that of another lamp, then all lamps installed in unlabeled luminaires must be non-standard.

Various luminaires now display labels of different colors. HPS luminaires are usually labelled in white or yellow, mercury in blue.

Fifth, IR TL-1-27 describes "non-standard" as "non-compliance with accepted national and industry practices and specifications for streetlighting." It is not clear how this definition would reflect a cost differential. In any case, BECo's 35W HPS lamp does not appear to be listed as a streetlighting lamp by the manufacturers, and the luminaire is not included the luminaire data provided in IR TL-1-37, or other luminaire catalogs I have seen. Thus, the 35W HPS seems to fail the "accepted industry practices" criterion, but does not carry a 25% cost penalty. I also doubt that BECo's use of the 67W Sylvania SuperSaver incandescent for streetlighting would be considered an accepted industry practice.

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Sixth, BECo attempts to link the "standard" classification to testing (IR TL-1-12, IR TL-1-27). notes that the lamps it lists currently meet ANSI standards, but ANSI standards simply define the characteristics of a piece of equipment, so that all equipment meeting the standards will be interchangeable. Despite its emphasis on field testing, BECo has not tested the Daylux lamp, has no plans to do so (IR TL-1-36), and has never tested any lamp BECo asserts that it "will work with any (IR TL-1-38). municipality desiring such a test," but has refused to work with Lexington on testing of the Daylux lamp over the last 18 months (Exhibits PLC-4 to PLC-8, attached to my direct), and does not appear to have responded to the Town's request for a test of compact fluorescents (Exhibit PLC-12, which is taken from IR TL-1-15), or for a metal halide spotlight (Exhibit PLC-13, also from IR TL-1-15).

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Seventh, BECo has introduced the idea that the warranty on the Daylux lamp is different from those offered for streetlighting lamps (IR BE-LEX-33). The Iwasaki distributor, C.E.W. Lighting, reports that there is no difference between the warranty on the Daylux lamp and those on the standard HPS lamps BECo purchases for streetlighting.

- 11 Q: What new information do you have regarding the derivation of 12 the 25% adder for non-standard streetlighting lamps?
- A: BECo essentially refused to answer the Town's questions regarding the derivation of the 25% adder (IR TL-1-23 and IR TL-1-25). However, BECo's answers disavow the 1-hour-per-lamp, 1-hour-per-luminaire, and the 10% T&D cost estimates, leaving BECo with no basis for the 25% surcharge.
- 18 Q: What new information do you have regarding Edison's opposition 19 to customer ownership of streetlighting equipment on Edison 20 poles?
- 21 A: In IR-TL-6, IR-TL-7, IR-TL-9, and IR-TL-29, BECo raises safety
 22 and liability concerns related to the Town or its contractor
 23 performing streetlighting maintenance "in the area of a pole
 24 containing live electric lines." BECo does not explain why

this concern cannot be dealt with through training, insurance, and equipment requirements. As a minimal alternative, BECo could provide maintenance for customer-owned equipment, as does Massachusetts Electric. In any case, BECo's concern about non-employees working "in the area containing live electric lines" is not plausible, since BECo uses contractor crews to trim trees "in the area containing live electric lines" (IR TL-1-15, item 21).

9 Q: Are there any other matters on you would like to update the
10 Commission?

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A:

Yes. First, I have corrected an error in my Table 6. The inflation adjustments in columns was misstated as 0.92. Since the purpose of this line was to adjust costs to 1992\$, and since the Daylux costs were already stated in 1992\$, the value should have been 1.00. However, IR TL-1-32 indicates that BECo miscalculated the conversion of its 1990\$ costs to 1992\$. Inflation was 1% in 1991 and 2.1% in 1992, but BECo included only 2.1% inflation from 1990-92. I have corrected for this error by reducing the Daylux costs by 1%, so all costs are stated in costs 1% lower than 1992\$. My corrected Table 6 is attached.

Second, the Town of Lexington has requested Settlement Board funding of a demonstration project for high-quality, efficient streetlighting options, as documented in Exhibit PLC-16. This action increases the importance of the ninth recommendation in my direct testimony (p. 34).

3 Q: Has Edison responsed fully to discovery on streetlighting?

A: No. For example,

- In IR TL-1-8, BECo claims that it is unable to identify the charge for pole attachment included in the S-1 rates. It appears that BECo does not include an attachment charge in the S-1 rates; in any case, BECo should know what it charges.
- In IR TL-1-17, BECo fails to provide any information on the suppliers for its three largest incandescent lamps.
- In IR TL-1-37, BECo fails to provide information on the appearance of the packaging and appearance of any of its lamps, or any information on the 35W luminaire.
- Q: Does this conclude your supplemental testimony?
- 20 A: Yes.

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Table 1 (updated): Comparison of Streetlighting Lamps

Technology	•	Total Watts	Photopic Lumens		Color Rendition Index	Lamp n Life (hrs)							
OFFERED BY BECO													
Incandescent	60	60	200	3.3	100	8,000							
	87	87	1,000	11.5	100	6,000							
	176	176	2,500	14.2	100	3,000							
	274	274	4,000	14.6	100	3,000							
	376	376	6,000	16.0	100	Not provided							
	577	577	10,000	17.3	100	Not provided							
	855	855	15,000	17.5	100	Not provided							
Mercury Vapor	100	131	3,500	26.7	45	24,000							
	175	213	7,000	32.9	45	24,000							
	250	296	11,000	37.2	. 45	24,000							
	400	460	20,000	43.5	45	24,000							
·	700	7 80	35,000	44.9	45	24,000							
High-Pressure	35	41	2,150	52.4	22	16,000							
Sodium (HPS)	50	58	4,000	69.0	2 2	24,000							
	100	117	9,500	81.2	22	24,000							
	150	175	16,000	91.4	22	24,000							
	250	295	25,000	84.7	22	24,000							
	400	47Ó	45,000	95.7	22	24,000							

Table 5 (updated): Number of BECo Streetlighting Lamps

Technology			Currently Installed BECo-owned Lamps					
			Exh PLC-1					
OFFERED BY BE	СО							
Incandescent	60	200	1,500	1,464				
·	75	800	1,000	1,025				
	87	1,000	2,583	2,606				
	176	2,500	250	266				
	274	4,000	23	81				
•	376	6,000	167	168				
	577	10,000	258	266				
	855	15,000	550	550				
Mercury Vapo	100	3,500	30,000	28,401				
	175	7,000	21,000	21,265				
	250	11,000	9,700	9,560				
	400	20,000	8,200	8,620				
•	700	35,000	625	724				
High-Pressure		2,150	1,900	1,898				
Sodium (HPS) 50	4,000	9,400	10,149				
	100	9,500	6,000	6,923				
	150	16,000	3,600	3,775				
	250	25,000	4,000	4,272				
	400	45,000	1,400	1,606				

Table 6: Comparison of Daylux Rates with Different Inputs (revised) (Page 1)

A B C D E

· •	A	В	С	D	${f E}$
	Standard 50W	~50W		_C &	D &
	HPS	per BECO	no adder	hr life	\$20 lamp (1992\$)
watts	58	58	58	58	58
1990\$ luminaire \$ non-standard adder	\$40.62	\$59.00 259		\$59.00	\$59.00
Lamp life (hrs)	24,000	10,000	10,000	12,000	12,000
Standard HPS life	24,000	24,000	24,000	24,000	24,000
Lamp cost (\$)	\$11.86	\$25.00	\$25.00	\$25.00	\$20.00
lum + lamp	\$52.48	\$148.75	\$119.00	\$109.00	\$99.00
Eng & sup 15%	\$7.87	\$22.31	\$17.85	\$16.35	\$14.85
Inc'ntals 10%	\$6.04	\$17.11	\$13.69	\$12.54	\$11.39
A&G load 0.0065	\$0.43	\$1.22	\$0.98	\$0.90	\$0.81
Total First Cost	\$66.82	\$189.39	\$151.51	\$138.78	\$126.05
Adjust to 1992\$	1.021	1.021	1.021	1.021	0.99
Adjusted	\$68.22	\$193.37	\$154.70	\$141.70	\$124.80
Class 1 Install	\$206.68	\$206.68	\$206.68	\$206.68	\$206.68
Total Installed	\$274.90	\$400.05	\$361.38	\$348.38	\$331.48
carry cos 15.07%	\$41.43	\$60.29	\$54.46	\$52.50	\$49.95
O&M	\$38.94	\$38.94	\$38.94	\$38.94	\$38.94
power @ \$0.05985 /kWh & 4200 hr	\$14.58	\$14.58	\$14.58	\$14.58	\$14.58
Annual Total Cost	\$94.95	\$113.81	\$107.98	\$106.02	\$103.47
Monthly Total Cost	\$7.91	\$9.48	\$9.00	\$8.83	\$8.62
Cost - HPS Cost	\$0.00	\$1.57	\$1.09	\$0.92	\$0.71

Table 6: Comparison of Daylux Rates with Different Inputs (revised) (Page 2)

(ICVIDEA)	F	G	. Н	I
	Daylux E &		Daylux G w/	
	16,800		luminaire	
	hr HPS	penalty		
watts	58	58	35W HPS 58	50W +\$5 58
	30	50	30	50
1990\$				
luminaire \$	\$59.00	\$59.00	\$35.74	\$45.95
non-standard adder Lamp life (hrs)			*****	ناف باف باف باف باف باف باف باف باف باف ب
Standard HPS life	12,000 16,800		**********	
Lamp cost (\$)	\$20.00	\$20.00		\$20.00
hamp cost (3)	\$20.00	\$20.00	\$20.00	\$20.00
lum + lamp	\$87.00	\$79.00	\$64.09	\$74.30
Eng & sup 15%	\$13.05	\$11.85	\$9.61	\$11.15
Inc'ntals 10%	\$10.01	\$9.09	\$7.37	\$8.54
A&G load 0.0065	\$0.72	\$0.65	\$0.53	\$0.61
Total First Cost	\$110.77	\$100.58	\$81.60	\$94.60
Adjust to 1992\$	0.99	0.99	0.99	0.99
Adjusted	\$109.67	\$99.59	\$80.79	\$93.67
Class 1 Install	\$206.68	\$206.68	\$206.68	\$206.68
Total Installed	\$316.35	\$306.27	\$287.47	\$300.35
carry cos 15.07%	\$47.67	\$46.15	\$43.32	\$45.26
O&M	\$38.94	\$38.94	\$38.94	\$38.94
power @ \$0.05985 /kWh & 4200 hr	\$14.58	\$14.58	\$14.58	\$14.58
Annual Total Cost	\$101.19	\$99.67	\$96.84	\$98.78
Monthly Total Cost	\$8.43	\$8.31	\$8.07	\$8.23
Cost - HPS Cost	\$0.52	\$0.39	\$0.16	\$0.32

Table 7: Size of BECo Streetlighting Lamps

Technology	Lamp Watts	Photopic Lumens	Bulb Length	Base	-	Manufacturer					
	(inches) GE		Phillips	Iwasaki	Sylvania						
OFFERED BY BEC	ю.										
Mercury Vapor	100	0 3,500 7.75 Mogul E-23 1/2 ED-23 1/2		,	ED-23 1/2						
	175	7,000	8.31	Mogul	E-28	ED-28		BT-28			
	250	11,000	8.31	Mogul	E-28	ED-28		BT-28			
	400	20,000	11.5	Mogul	E-37	E-37		BT-37			
	700	35,000	15.38	Mogul	BT-46	BT-46					
High-Pressure	35	2,150	5.44	Medium	B-17	ED-17	E-17	ED-17			
Sodium (HPS)	50	4,000	7.75	Mogul	E-23 1/2	ED-23 1/2	ED-23 1/2 1	ED-23 1/2			
	100	9,500	7.75	Mogul	E-23 1/2	ED-23 1/2	ED-23 1/2 I	ED-23 1/2			
	150	16,000	7.75	Mogul	E-23 1/2	ED-23 1/2	ED-23 1/2 I	ED-23 1/2			
	250	25,000	9.75	Mogul	E-18	ED-18	T-15	ED-18			
	400	45,000	9.75	Mogul	E-18	ED-18	τ-15	ED-18			
ALTERNATIVES											
White HPS	50	2,500	4.25	Medium			T-9.5				

Service Lifetime of 1000-lumen Table 8:

Case a: BECo data as reported

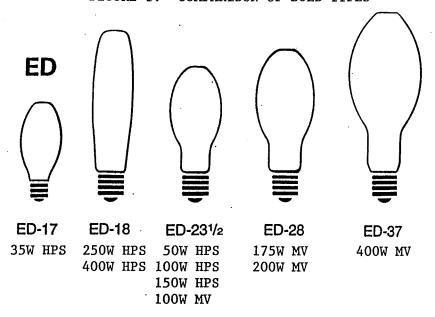
Year	Lamps Replaced	Lamp Life	Lamp Life
	-	(years)	(hours)
	[1]	[2]	[3]
1991	2222	1.17	4926
1990	1018	2.56	10752
1989	2418	1.08	4527
1988	2640	0.99	4146
Average	2074.5	1.26	5276

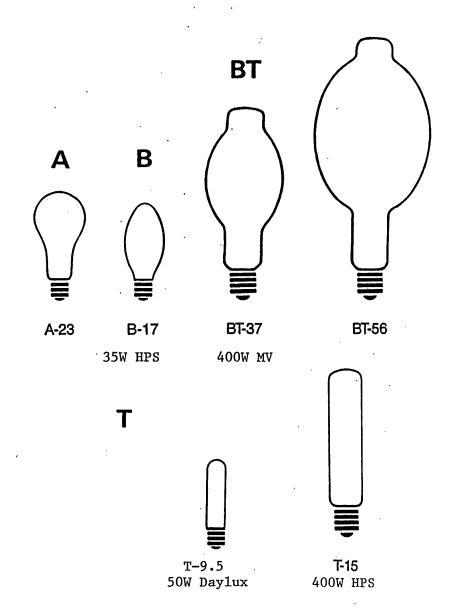
Notes: [1] from RR-AG-55. [2] = [1] / lamp # 20 [3] = [2] * 4200 hours. 2606

Case b: BECo data, corrected for apparent error

Year	Lamps Replaced	Lamp Life	Lamp Life
	портисси	(years)	(hours)
•	[1]	[2]	[3]
1991	2222	1.17	4926
1990	2018	1.29	5424
1989	2418	1.08	4527
1988	2640	0.99	4146
Average	2324.5	1.12	4709

FIGURE 1: COMPARISON OF BULB TYPES





EXHIBIL BIC-TT

C.E.W. Lighting, Inc.



May 1, 1991

Mr. Pete Kovner
Lexington Lighting Options Committee
12 Independence Ave.
Lexington, MA 02173

Dear Mr. Kovner,

I refer to your letter dated May 1, together with the letter from Randall Rice, and wish to comment on his letter. Apparently, he spoke with my brother, Paul Roth, who informed him that the lamp would operate on a standard 50W reactor ballast. The recommendation to use this on a high power factor unit is simply from a utility supply point of view in order to ensure the lowest current usage.

The Daylux lamp will color shift at about 10,000 hours and even though the lamp has an average life of 12,000 hours, we do recommend that the lamps be changed if the color starts shifting adversely to the orange spectrum. This lamp certainly will not color shift as the former Westinghouse lamps did, as the technology is completely different. However, it must be understood that if the supply voltage to these lamps has more than a 5% shift either way, that this might create some minor color change which may be noticeable when comparing one lamp to another. Because of the high pressure that these lamps operate under, they do require a more stable control and if you would like to have no color shift at all, we can recommend an electronic ballast that will be available from third quarter 1991.

I don't believe for the purpose you wish to use it for, that the slight color variation would require anything but a standard 50W reactor ballast.

I hope this now clarifies the situation and should Mr. Rice or any other person on the committee wish to talk to me personally, I would be happy to answer any of their questions.

Sincercly

Peter L. Roth

President

PLR/tm

cc: Greg Lutin

EXHIBIL DFC-15



April 30, 1991

Mr. John Murphy Boston Edison 800 Boylston Street Boston, MA 02199

Dear Mr. Murphy:

Enclosed is a letter to the Board of Selectmen from the Lexington Lighting Options Committee detailing a test location for compact fluorescent street lights. The pole numbers are as follows:

Winthrop Road
John Poulter Road

#113/20 #2 and #4

Please let me know what, if anything, the Town needs to do next to get this test installation started.

Very truly yours

Peter M. Chalpin

Assistant Town Engineer

PMC:m

Enclosure:

cc: Richard J. White, Town Manager

Richard E. Spiers, Director D.P.W./Engineering

Francis X. Fields, P.E., Town Engineer

TL-1-15 No. 12 Page 1 of 2

edison.utl

EXHIBIL brc-13

BOSTON EDISON

800 Boylston Street

Boston, Massachusetts 02199

March 8, 1991

Mr. Richard E. Spiers Director D.P.W./Engineering 1625 Massachusetts Avenue Lexington, MA 02173

Re: Police Spot Lights

Dear Mr. Spiers:

Pursuant to your request regarding the attachment of spot lights and associate equipment (metering and switching) on Boston Edison Company lamps numbers 7 and 8. Massachusetts Avenue; after consulting our Engineering and Construction Departments it is their recommendation that concrete lamp posts are not structurally suited to accommodate your proposal — see attachment.

As always, I will work with the Town of Lexington in pursuing alternative method of illuminating your traffic officers. If there is any additional information that you require, please let me know; I shall be glad to help you.

Very truly yours,

John J./ Murphy

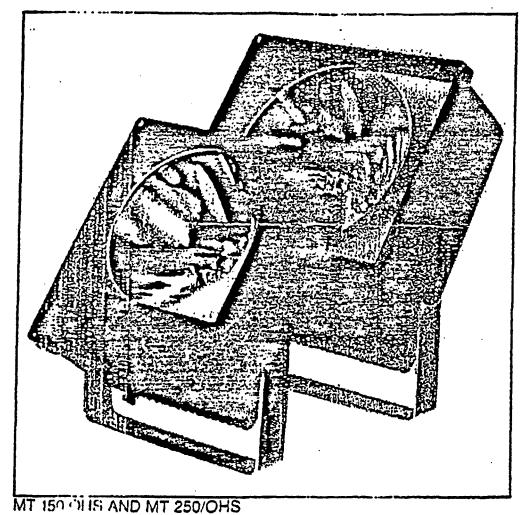
Municipal Representative Energy Services Department

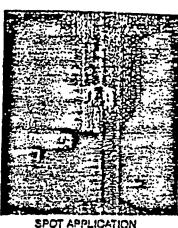
JJM/eah

TL-1-15 No.7 Pagelofa

(17)

MIRO-T O'HARE 150/250 SPOT HOI" ME TAL HALIDE ADJUSTABLE SPOTLIGHT

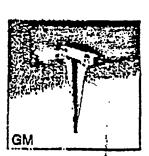




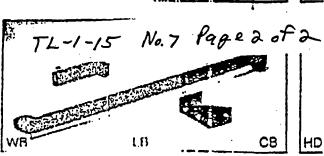
Offers exceptionally concentrated light distribution through a computer calculated rotary symmetrical anodized aluminum reflector. The unit produces maximum light efficiency when Illuminating distant projects. The robust dle-cast minimum casting is standard in a black textured powder coated finish. Bronzo tom or white available as an option. Complete with tempered glass, a sillcon ganket, non-corrosive outer steel parts. Fixture supplied with HQIM lamp.

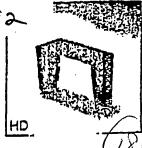
The 150 watt lamp available in 4300°K and 3000 k. Unless otherwise specified. 4300'K will be shipped.

The 250 watt lamp available in 4300 K and 5400 K. Unless otherwise specified. 4300'K will be shipped.









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co. Gruder	From P. Chernick
Dept.	Co.
Fax #	Phone #
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March 21, 1991

Mr. John Murphy Municipal Representative Boston Edison 800 Boylston Street Boston, MA 02199

RE: Police Spot Lights

Dear Mr. Murphy,

With regard to your 3/18/91 letter, we request that Boston Edison's Engineering and Construction Departments re-evaluate their recommendation that poles #7 and #8, Mass. Avenue, are not structurally suited to accommodate our proposal to install police spot lights and associated equipment. We make this request in view of the fact that there are, at present, spot lights attached to concrete poles in the Lexington High School parking lot. It is our understanding that Boston Edison installed this equipment at the High School and we see some inconsistency in the company's decision regarding our recent request.

Very Truly Yours,

Richard F. Smers

Dir. of Public Works/Engineering

pc/mnv

TL-1-15 No. 8 Page/of/

BOSTON EDISON
800 Boylston Street
Boston, Massachusetts 02199

April 1, 1991

Mr. Richard E. Spiers Director DPW./Engineering Lexington, MA 02173

Dear Mr. Spiers:

Relative to your letter dated March 21, 1991 regarding the installation of spot lights on Boston Edison Company lamp post, located on Massachusetts Avenue; our reasons for not approving this arrangement is not the luminaire (light) attachment but the metering and switching equipment that would have to be attached to our concrete lamp post.

The outdoor lighting lamp post at Lexington High School that you have referred to in your letter, have only the additional flood light attachment to them and not the electrical equipment that would be required at the Mass. Avenue location.

If there is any additional information that you require, please call me at 424-2278.

Very truly yours.

John J. Murphy

Municipal Representative Energy Services Department

TL-1-15 No.9 Page lof1



April 18, 1991

John J. Murphy, Municipal Representative Boston Edison Company 800 Boylston Street Boston, MA 02199

Dear Mr. Murphy:

I am responding to your April 1, 1991 letter and our subsequent telephone conversation regarding the installation of spot lights on the Boston Edison Company lamp post located on Massachusetts Avenue by Depot Square.

During our telephone conversation you reiterated Boston Edison's position that the metering and switching equipment necessary to operate the luminaire were the issue and not the luminaire attachment itself.

I explained that the Town is attempting to provide a safe working environment for the police officers assigned to the traffic detail in the center at a reasonable cost. Erecting another set of lighting poles, next to Boston Edison's, is expensive and redundant. The logical solution is to attach an appropriate light on the existing Edison owned poles. I suggested that in lieu of a meter Edison could establish an estimated rate (monthly, bi-monthly, etc.) and bill the Town accordingly. I further suggested that a timing device could be installed to turn the light on and off at the appropriate hours.

I recognize that there will be some expense here and I am willing to discuss that issue with you. I think our request is reasonable and attainable with a little planning and cooperation.

The issue is quite simple, will Boston Edison assist us in providing a safe working environment for our police officers?

Please contact me at your earliest convenience.

Sincerely.

ichard E. Spiers, Director

Public Works/Engineer

RES/J

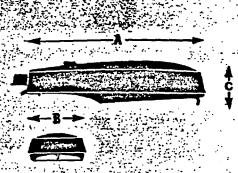
TL-1-15 No.11 Page 1 of1

EXHIBIT PLC-14

Dimensions

Horizontal Cutoff

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		Otmerision		:	-
- Borios	A			C	
13 & 14	281/4"	13"	٠, ٠٠	7"	
25 & 26	34%"	14"	.2	9"	:



Effective projected area for Series 13 is .74 sq. ft.; for Series 25-1.05 sq. ft.

Specifications

SUGGESTED SPECIFICATIONS

Luminaire shall be American Electric Horizontal
Cutoff Luminaire, catalog number_______
for______watt high pressure sodium lamp,
_______volt operation.

Luminaire housings, both upper and lower, shall be die-cast aluminum joined by an integrally cast pin hinge at the mounting end and one-hand latch at the door.

Hardware shall be corrosion-resistant type.

Lens shall be tempered glass.

Gasket shall be made of high temperature polyester fiber to filter air entering optical assembly.

Slipfitter shall be adaptable to 11/4" and 2" mast arms.

Ballasts shall be pre-wired at factory and suitable for operation in temperatures as low as -200F.

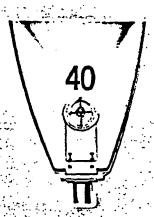
Reflector shall be anodic surfaced aluminum secured with spring latch for easy positioning and positive seal.

Terminal board shall be provided for connecting incoming line supply.

Luminaire finish shall be baked-on acrylic enamel.

OPTIONAL SPECIFICATIONS

A level indicator shall be provided that is visible from the ground.



Power-pad shall be provided for quick and easy ballast replacement in the field.

Luminaire shall be furnished with EEI-NEMA standard three terminal, polarized, locking type photoelectric control receptacle for use with American Electric photoelectric control, catalog number.

Attachment No. 1

-L-1-3719888

EXHIBIT PLC-15

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EXHIBIT PLC-16



Town of Lexington, Massachusetts

OFFICE OF SELECTMEN

JACQUELYN R. SMITH, CHAIRMAN PAUL W. MARSHALL JOHN O. EDDISON WILLIAM J. DAILEY, JR. LEO P. McSWEENEY

TEL: (617) 861-2708 (617) 861-2709 FAX: (617) 863-2350

June 22, 1992

Jerrold Oppenheim, Esq. Assistant Attorney General 131 Tremont Street Boston, MA 02111

Dear Mr. Oppenheim:

Enclosed please find the proposal of the Town of Lexington for funding the demonstration of high-efficiency, high-quality street lighting options.

Boston Edison's existing high-efficiency options for its streetlighting customers on the S-1 rate schedule, including the Town of Lexington, are limited to various sizes of conventional high-pressure sodium (HPS) lamps. These HPS lamps have several disadvantages:

- They produce light with an orange cast, which distorts the colors that give Lexington, and other old New England towns, their special visual appeal. Leaves look brown rather than green, snow looks pink rather than white, and so on. These aesthetic concerns have resulted in the Town's Historic Districts Commission prohibiting installation of HPS lights in the Historic Districts of the Town. Boston Edison currently does not offer any efficient lighting option that can be installed in the Historic Districts, in which Lexington uses about 14% of its streetlighting energy.
- The human eye has difficulty focusing properly in the orange light of HPS lamps, resulting in fuzzier perception of objects under HPS than under other lights with the same light output. Hence, maintaining acceptable visibility requires a higher light level, which further interferes with the traditional appearance of the Town at night, as well as reducing energy savings. This problem is exacerbated by the absence of any HPS lamp comparable to the 1000 lumen incandescent lamps currently installed in most Lexington neighborhoods; the proposed HPS replacement for these lamps would quadruple the lighting level.

Settlement Board

- Even with higher lighting levels, the combination of less acute focusing and the lack of color definition creates safety problems. Pedestrians, obstacles, and other objects are harder to distinguish, especially for drivers.
- The lack of color definition can also create security problems, since it is more difficult to identify people and vehicles.

In this period of financial stress, municipal governments are severely pressed by any unnecessary cost. Lexington is eager to reduce its lighting costs and energy usage, so long as no major compromises are necessary in the quality of the light. The Town has attempted to negotiate additional efficient lighting options with Boston Edison, but without effective results.

At the Town's insistence, Boston Edison prepared an estimated rate for one high-quality light (a 50W Daylux white HPS), but imposed several arbitrary penalties for use of this "non-standard" lamp. The resulting rate was uneconomical for the Town. Edison has also refused to offer efficient lamps as part of the standard S-1 rate. Edison refused to submit the proposed rate to the Department of Public Utilities (DPU) for review until the Town committed itself to a large order of the lamps; since the Town could not be assured that the rate eventually approved by the DPU would offer any savings, the Town could not make such a commitment. Finally, Edison refused to negotiate further, on the grounds that the issue of streetlighting had been raised in DPU 90-335. Thus, the major market barriers to these efficiency measures are Edison's control of streetlighting and refusal to offer energy-saving white or near-white lights.

To break this impasse, the Town's Lighting Options Committee has prepared the enclosed proposal. The proposed demonstration project would directly make efficient high-quality lighting available for outdoor use in Lexington. To avoid the problem of the lack of current rates for these lights, we have proposed that the Settlement funds be used to pay the difference in cost between the tariffed HPS equipment and the high-quality alternatives. This should allow Edison to charge the Town under the tariffed HPS rates. Once the demonstration project encourages Boston Edison to offer this range of options at reasonable rates throughout its service territory, virtually all of the 7,000 incandescent and 90,000 mercury vapor Edison-owned lamps could be replaced with efficient high-quality lamps.

If the Town's proposal is implemented as currently structured, the reduction in energy use would be about 980 MWH, or roughly half of the Town's streetlighting energy. This reduction is about 210 MWH greater than could be achieved with Edison's current offering, primarily due to the lack of options for the Historic Districts. The annual bill reductions would be worth about \$80,000. Increased use of electronic ballasts would increase the savings, while any problems with applying specific technologies could slightly reduce the total. On a rate basis, the investment should pay for itself in less than two years.

Settlement Board

If you have any questions about this proposal, please contact the Lexington Lighting Options Committee through Myla Kabat-Zinn (861-8322) or Peter Kovner (861-7448).

Very truly yours,

Board of Selectmen

Jacquelyn R. Smith, Chairman

JRS:pas

PROPOSAL FOR DEMONSTRATION OF EFFICIENT STREET LIGHTING OPTIONS

from the

Town of Lexington, Massachusetts

to the

Boston Edison Settlement Board

The Town of Lexington proposes to use \$123,000 of Settlement Board funds to upgrade all the incandescent and mercury vapor street lights in the Town to more efficient lighting with good color qualities. This lighting is owned by Boston Edison and provided to the Town under the 5-1 rate schedule. The project would demonstrate the use of state-of-the art lighting systems for outdoor public lighting, and develop the capability within Boston Edison to offer these lights to all public and private lighting customers.

Each lamp installed in this project will have a color rendition index (CRI) of at least 65, and efficacy of at least 40 lumens per watt, including ballast losses. The lamps being replaced will be incandescents (CRI 100, 11-17 lumens/watt) and mercury vapor (CRI 45, 25-45 lumens/watt). Each replacement will reduce installed wattage, and annual kWh consumption. The Town's small number of existing standard high-pressure sodium (HPS) lamps will not be included in this program; the Town will probably want to change out these lights, once Boston Edison publishes rates for a range of high-quality lamps.

Whenever a range of ballasts is available, each lamping option will be evaluated with the standard ballast and the most efficient applicable ballast.

For cost estimation purposes, we have included only the difference in cost between the standard HPS equipment Boston Edison would normally install, and the proposed equipment. Boston Edison has offered to change out the existing equipment for standard HPS at no charge to the Town. We have also assumed that Boston Edison will provide temporary set-ups for testing and demonstration of competing alternatives, especially for screw-in replacements for the incandescents.

The most thoroughly researched lighting alternative is the 50W Daylux white HPS. We believe that the installed cost of this system is about \$40 more than the standard HPS alternative. The bulb is about \$4 extra, the smaller bulb requires a special luminaire for which Edison has a bid of \$13 over the standard installation, the electronic ballast would cost \$15 extra, and Edison estimates about 25% for engineering, supplies, and incidentals. We have assumed the same \$40/lamp differential for

Proposal from Lexington to Settlement Board April 5, 1992 Page 2

the replacement of the incandescents, since some of the compact fluorescent equipment may be special orders. In the higher wattages (over 70W) of HPS, the color-corrected lamps use the same ballasts and luminaires as the standard lamps; we have assumed a differential of \$20/lamp for these installations, to cover the incremental costs of electronic ballasts. We have also included \$40/lamp for an assumed 30 metal halide replacement lamps, to allow for any special luminaire replacements.

Since street lights are in operation 4200 hours annually, the potential energy savings are considerable. The Town's current energy consumption for 3200 street lights is 2 GWH/yr. Replacing just one 131W mercury-vapor fixture with a 58W color-corrected sodium fixture will save 307 kWh/yr.

The proposed changes are listed in the attached table. The following are the highlights of the proposed conversion:

I. Replace 1012 87W incandescents with 28W low-temperature compact fluorescents (Phillips PLC*15mm/28 or equivalent, CRI 82), with 5W ballasts.

Various applications of the compact fluorescents will be tested. Some may be screwed into existing incandescent fixtures, replacing a bare bulb with a bare tube. The use of slip-on reflectors in street lighting applications will also be demonstrated. Others may be installed in drop-dish or cut-off luminaires. If the compact fluorescents are not suitable replacements for some incandescent installations, the Daylux lamps would be used.

II. Replace 1439 131W mercury vapor and 48 176W incandescents with Daylux 50W white high-pressure sodium lamps (CRI 82).

This, and all higher-wattage lamps, will be installed in cut-off luminaires. The 50W Daylux performs best with an electronic 4W ballast, which will be used instead of the magnetic 8W ballast.

III. Replace some of the 128 213W mercury vapor and 4 376W incandescents with 95W color-corrected HPS (GE Lucalox LU95/SP28 or equivalent, CRI 70).

This lamp and higher-wattage HPS lamps will be demonstrated in both the clear version (which focuses light better) and the diffuse version (which reduces glare when seen from directly underneath the fixture).

Proposal from Lexington to Settlement Board April 5, 1992 Page 3

- IV. Replace the remainder of the 213W mercury vapor and 376W incandescents, and 386 296W mercury vapor and 3 577W incandescents with 100W color-corrected HPS (GE Lucalox LU150/DX or equivalent, CRI 65).
- V. Replace the 53 460W mercury vapor with a mix of 250W color-corrected HPS (GE Lucalox LU250/DX or equivalent, CRI 65) and 250W metal halide (Venture Super Pro-Arc MS 250/HOR or equivalent, CRI 65).

The choice between color-corrected HPS and metal halide will be made on the basis of the character of the light and its interaction with decorative lighting in the Town Center. The metal halide may be demonstrated in both clear and coated versions.

VI. Replace 6 780W mercury vapor lamps with 250W metal halide, 250W color-corrected HPS, 400W color-corrected HPS, or 400W metal halide (Venture Super Pro-Arc MS 250/HOR or equivalent, CRI 65).

PROJECT COST ESTIMATE:

1012 compact fluorescents @ \$40/lamp =	\$40,480
1487 Daylux 50W HPS @ \$40/lamp =	59,480
550 other color-corrected HPS @ 20/lamp =	11,000
30 large metal halides @ \$40/lamp =	1,200
TOTAL LAMPING COST	\$112,160
Test Configurations (\$300/lamp * 6 lamps/test * 8 tests)	14,400
Lighting Consultant to Town	10,000
GRAND TOTAL	\$136, 560

The numbers of compact fluorescent and metal halides are subject to final design. Due to the uncertainties in the individual components, we request that the Settlement Board fund the demonstration project as a single budget item, and allow the Town to reallocate costs between categories as necessary.

If Boston Edison identifies additional costs associated with this proposal, we would ask that these extra funds be allocated by the Settlement Board.

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^{*} These five types are 94% of lamps and 95% of energy used.